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CONCEPTUALIZING USER SATISFACTION IN THE UBIQUITOUS COMPUTING ERA

Research-in-Progress

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Abstract

In this research-in-progress paper we argue that technology in the ubiquitous computing era offers experiences to users that extend well beyond the functional, practical applications offered in the world of work. In this era a realm of engagement is opening up to the individual that transcends the utilitarian, to encompass hedonic and social existence. Our central argument, therefore, is that user satisfaction is a notion which must extend to encompass rich, holistic human experience involving complex and fleeting interactions, driven by highly personal circumstances. We argue that the expectations, requirements and value perceptions of individuals in this dynamic context may only be anticipated and understood if situational *factors (such as location, time, context, history-of-use) and* quality of life *factors (such as life stage, mobility, health, income, background, education) are taken into account. We identify the fundamental differences in key characteristics of user satisfaction between the traditional and ubiquitous computing environments and provide details about our own research approach, in which we are exploring ubiquitous content provision from the perspective of content providers.*

Keywords: User satisfaction, ubiquitous mobile technology, ubiquitous content provision, participation, information system evaluation, quality of life

Introduction

Technology in the ubiquitous computing era offers experiences to users that extend well beyond the functional, practical applications offered in the world of work. In this era a realm of engagement is opening up to the individual that transcends the utilitarian, to encompass hedonic and social existence. In this research-in-progress paper, our central argument, therefore, is that user satisfaction is a notion which must extend to encompass the rich, holistic human experience involving complex and fleeting interactions, driven by highly personal circumstances.

In this environment the users themselves are ubiquitous. We argue that ubiquitous technology users continuously seek to optimize each moment of their waking hours, by utilizing the devices which they carry with them most of the time. Here we perceive ubiquitous technology users as always connected/available and standing ready to participate. In this sense, the ubiquitous computing environment acts as a ***platform*** where people meet to create and exchange content. This creation-exchange platform is conceptual rather than physical or technological. It is not a thing that is produced by technology; it is ***how*** we use technology. In this paper therefore, we perceive users to be ubiquitous (ever-present, waiting to participate) and define content broadly and inclusively to denote the information, multimedia, applications, functionality, services, meanings, experiences and opportunities that are available via the ubiquitous computing platform. On this creation-exchange platform users form into groups fleetingly, based upon situational conditions, and then these groups transform or dissipate as the conditions change. The value that users place upon content and the satisfaction they may (or may not) experience in this dynamic context tends to depend then upon highly individual situational factors (such as location, time, context, quality of life and predicament).

This research-in-progress paper is structured as follows: First, we provide a definition of the user satisfaction construct in the Information System literature, highlighting the underlying assumptions. Then we describe the dynamic nature of participation and evaluation on the ubiquitous computing platform, stressing the limitations of the traditional user satisfaction construct as a measure of information system success in the ubiquitous computing era. Finally we identify the fundamental differences in the key characteristics of user satisfaction between the two environments and provide details about our own research plans, in which we are exploring ubiquitous content provision from the perspective of content providers.

The User Satisfaction Construct in the Literature

The user satisfaction construct is used to test the levels of satisfaction users experience with aspects of an information system and with the system overall. This test is performed by system providers upon (a) existing, well-established systems; (b) newly introduced systems; and (c) systems under development, awaiting implementation. The feedback collected during the test is geared to help providers to judge matters such as: Will this information system be successful once it is released? Will this information system be easy to implement? Which aspects of this information system are not satisfying to users, and how can they be improved? Is this information system more satisfying to users than another system? Are our users happy? How could we improve our performance?

Information system providers tend to run the user satisfaction test at critical stages in the system development process or life-cycle. User satisfaction reports are generated and used to defend decisions about the system, or as benchmarks for future analysis. While they may be used in tandem with other metrics (such as sales figures, profit and loss statements, technical reviews, etc.) they may also be used in isolation and exclusively because they are relatively convenient and cost-effective to run.

There are numerous user satisfaction testing instruments available. They vary in terms of (a) the type of information system, (b) the type of user, and (c) aspects/dimensions of satisfaction. Test recipients are usually presented with a questionnaire and asked to indicate their level of satisfaction ["extremely satisfied" — "extremely dissatisfied"] with system characteristics (factors) such as the content, technology, interface, benefits, etc.

Definition of User Satisfaction from the Literature

The user satisfaction construct appears in many forms, both explicit and implicit, throughout a great portion of the Information Systems literature. It is seen widely as an important measure and determinant of information system success (Bailey and Pearson 1983; DeLone and McLean 1992; Doll and Torkzadeh 1991; Ives and Olson 1984; Zviran and Erlich 2003). For the most part this construct is seen to concern the users' overall affective evaluation of their experience with the system (Chin and Lee 2000).

Organizational Structures Define User Groups

Information system users are defined in the literature according to the ***way*** (not why, when, how, where) they use the system. The ways that people use the system are described in roles (for example: end computer user, manager, professional, operator, content creator, consumer, provider, etc.). People are seen as occupiers of roles within an organization (for example: a business, university, bank, industry, etc.). People become users of the system when they occupy a role. In this sense ***organizational structures*** are used to define users and characteristics of the system. Most of the studies we reviewed were conducted within an organizational context. Table 1 provides a breakdown of the various systems, user groups and satisfaction factors that form the basis of the construct in the literature.

Dimensions of Satisfaction (Measurement Factors)

In 1983 Bailey and Pearson defined 38 factors affecting computer user satisfaction which, if adjusted would "improve the productivity [quality] of information systems". This approach (defining factors) set the scene for user satisfaction measurement thereafter – almost all tools specify factors. The number and type of factors vary greatly from study to study, depending upon the type of information system, users and organization. This indicates that user satisfaction remains an elusive operational construct. We argue that user satisfaction is *always* context dependent.

In 1988 Doll and Torkzadeh resolved 5 key antecedents to "End-user Computing Satisfaction" – content, accuracy, format, ease-of-use, timeliness. These antecedents appear frequently in the literature. Doll revisited the construct in several subsequent studies eventually finding that "the structural weights for some first-order factors (e.g., accuracy) are not equivalent across subgroups" and therefore "that user satisfaction is a context-sensitive measure of system success" (Doll and Torkzadeh 1988; Doll and Deng et al. 2004; Doll and Torkzadeh 1991; Doll and Xia et al. 1994).

Attitudes, Intentions and System Use

Etezadi-Amoli and Farhoomand (1991) imply that the primary purpose for measuring end-user computing satisfaction is to predict certain behaviors and thus the measurement of end-user computing satisfaction should be somehow more closely tied to attitude-behavior theory. Early behavioral theories suggested that by tapping into user attitudes towards an information system, providers could determine their intentions to use it and therefore predict its likelihood of success (Ajzen 1991; Fishbein and Ajzen 1975). However, a number of studies call upon theories of social and behavioral psychology to explain that beliefs and attitudes (user satisfaction) are weak predictors of behavior (system usage) (Davis 1989; Goodhue and Klein et al. 2000; Hartwick and Barki 1994; Melone 1990; Wixom and Todd 2005). "Action, or decision-making do not presume prior thought in the way motion presumes some prior force" (Introna and Whittaker 2002).

In 2000 Chin argued that users develop their overall perceptions of satisfaction by comparing prior expectations and desires with *post hoc* usage perceptions. This notion of satisfaction being a relative and contextual phenomenon is further explored by Joshi (1989) who found that users in organizations will form perceptions of fairness and equity – by comparing their allocation of information system resources to others – and that these perceptions will influence their overall sense of satisfaction with the system. Zmud and Sampson (1994) argue that unless the context (of the user and the information system) is clearly understood, "using a general purpose computer satisfaction instrument introduces ambiguity into the evaluation process".

Recent studies begin to see user satisfaction as a highly individual, personal response to influences extending beyond the workplace. Au (2008) considers satisfaction to derive from the "equitable fulfillment of needs" which span the whole user experience — encompassing work performance, relatedness, and self-development. Scheepers and Scheepers et al. (2006) found that "varying social contexts of individual use ... result in different social influences that affect the individual's perceptions of satisfaction with the mobile technology".

User Satisfaction as a Determinant of Information System Quality and Success

User satisfaction can be viewed as a means rather than a measure of system performance success and quality. In this sense, system success is seen to [almost automatically] eventuate from user satisfaction. For example, McKinney and Yoon (2002) held that web customer "satisfaction of internet-based services was required to establish long-term client relationships, critical to sustaining growth and market share, in the turbulent e-commerce environment". In other words, web-customer satisfaction leads to profitability. Although correlations have been found connecting system satisfaction to system usage and, less directly, system success (Bailey and Pearson 1983; Doll and Torkzadeh 1998; Doll and Xia et al. 1994; Ives and Olson 1984; Wixom and Todd 2005) much debate surrounds the issue, especially concerning the validity and generalizability of subjective user-survey results (Chen and Rodgers et al. 2008; DeLone

and McLean 1992; DeLone and McLean 2003; DeLone and McLean 2004; Khalifa and Liu 2004; Kim and Chan et al. 2007; Klenke 1992; Melone 1990; Seddon 1997; Wixom and Todd 2005; Zviran and Erlich 2003).

Rogers (1995) describes user satisfaction as part of the technology diffusion decision-making process. In this view, users who anticipate a satisfactory experience are expected to adopt a system, and unsatisfied users expected to discontinue their use of a system. Hence, satisfaction with a system is seen as a necessary step in the decision to start and to discontinue use of the system. Satisfaction is also seen here as a consequence of use. This is a pervasive view held among the information system marketing and promotion experts. "Satisfaction is the consequence of the customer's experiences during various purchasing stages: (a) need arousal, (b) information search, (c) alternatives evaluation, (d) purchase decision, and (e) post-purchase behavior" (Kotler 1997). "Experience (good, bad, satisfactory, any at all) moderates acceptance of the system" (Venkatesh and Morris et al. 2003).

Conversely, user dissatisfaction and the disconfirmation of user expectations have been tested in order to diagnose possible causes and to suggest corrective action (Baroudi and Orlikowski 1987; McKinney and Yoon 2002). "For IS professionals and providers, satisfaction is critical throughout the life of a system because dissatisfied stakeholders can derail implementation, discontinue using an important system, erode IS/IT budgets, or even transfer their entire IT infrastructure to a different organization" (Briggs and Reinig et al. 2008).

Table 1: User Satisfaction Literature: Key Studies

Year	Reference	User groups	System: satisfaction factors
2008	(Briggs and Reinig et al.)	Any user	**Any information system:** Yield Shift Theory: exploring the satisfaction response
2008	(Sullivan and Scheepers et al.)	Any user	**Any information system:** Continuous quality of life optimization principle
2008	(Au and Ngai et al.)	Front-end service staff	**Airline and hotel booking systems:** Equitable work performance, relatedness and self-development fulfilment
2008	(Chen and Rodgers et al.)	—	**REVIEW: E-satisfaction literature**
2007	(Choi and Lee et al.)	MDS users	**Mobile data services**: Contribution to quality of life across 11 life domains and overall quality of life
2006	(Scheepers and Scheepers et al.)	Mobile consultants	**Mobile appointment, clinical data, and billing systems:** Content, accuracy, format, ease of use, and timeliness
2005	(Wixom and Todd)	Managers	**Data warehousing software:** Information quality**:** (completeness, accuracy, format, currency); system quality: (reliability, flexibility, integration, accessibility, timeliness)
2005	(Kim)	e-Customers	**Online shopping websites:** 10 factors including: site design, log-on convenience, payment method
2005	(Abdinnour-Helm and Chaparro et al.)	Home owners and contractors	**Design and building supply websites:** Content, accuracy, format, ease-of-use, timeliness
2005	(Cheung and Lee)	Internet shoppers	**e-Retail websites:** Information, system and service quality
2004	(Wang and Liao)	m-Commerce consumers	**Mobile websites:** Navigation, search, availability, linking, speed, content quality, e-business interface, etc.
2004	(Khalifa and Liu)	—	**REVIEW: The state of research in IS satisfaction**
2004	(DeLone and McLean)	e-Customers	**e-Commerce websites:** Quality of system (download speed and ease-of-use), relevance of information, query responsiveness, overall satisfaction with online experience
2003	(Middleton)	Domestic broadband network consumers	**Local community broadband networks:** Perceived usefulness**,** availability of applications, content and services
2003	(Venkatesh and Morris et al.)	Mandatory and voluntary adopters	**Enterprise information systems:** Help to attain gains in job performance, experience (good, bad, satisfactory, any at all)
2003	(DeLone and McLean)	Users and decision-makers	**Enterprise information systems:** Info. satisfaction (user interface, flexibility, information quality, content and format)
2003	(Zviran and Erlich)	—	**REVIEW: Measuring IS user satisfaction**
2002	(McKinney and Yoon)	Web shoppers	**Online purchasing process:** Information (relevance, timeliness, reliability, etc.)**;** system (access, usability, etc.)
2000	(Chin and Lee)	Desktop, end-computer users	**Organizational information systems:** Comparing prior and *post hoc* perceptions of content**;** accuracy**;** format**;** timeliness**;** ease-of-use**.**

2000	(Goodhue and Klein et al.)	Mandatory and voluntary adopters	**Mandatory enterprise information systems:** Task Tech. Fit, (time to complete, accuracy, consistency, etc.)
1999	(Downing)	Customers	**Telephone interactive voice response systems:** Content**;** accuracy**;** format**;** timeliness**;** ease-of-use (observation used)
1996	(Etezadi-Amoli and Farhoomand)	Clerical, professional, managerial staff	**Organizational information systems:** Documentation, ease of use, functionality, quality of output, support, security
1994	(Hartwick and Barki)	Mandatory and voluntary adopters	**Enterprise information systems:** Content**;** accuracy**;** format**;** timeliness**;** ease-of-use (satisfaction is moderated and mediated by involvement/participation)
1992	(Klenke)	—	**REVIEW: Construct measurement in IS user satisfaction**
1990	(Melone)	—	**REVIEW: Theoretical assessment of user satisfaction construct – behavioral research**
1989	(Davis)	White-collar workers	**Organizational information systems:** Perceived usefulness**,** perceived ease-of-use
1988	(Doll and Torkzadeh)	Desktop, end-computer users	**Organizational information systems:** Content**,** accuracy**,** format**,** timeliness**,** ease-of-use
1987	(Baroudi and Orlikowski)	Clerical support personnel	**EDP – large transaction processing systems, mainframe and mini-computers:** Factors such as: relationship with EDP staff**,** processing of requests for changes**,** training, etc.
1984	(Ives and Olson)	Managers, operators	**Organizational information systems:** Job satisfaction, information satisfaction (user interface, flexibility, information quality, content and format)
1983	(Bailey and Pearson)	Managers, terminal users	**Data processing systems:** 38 factors such as: accuracy, reliability, timeliness, relevancy, confidence in system, etc.

Ubiquitous Computing Era — Pervasive, Invisible, Embedded

Eventually according to Weiser (1993), "technology will recede into the background of our lives". Weiser describes an age of calm technology where the purpose of the computer is to be a quiet, invisible servant helping people to do something else [unspecified]. He states that the highest ideal in the ubiquitous computing era is "to make a computer so imbedded, so fitting, so natural, that we use it without even thinking about it". He sees technology invisibly assisting human intuition and extending the unconscious (Weiser 1993).

To illustrate this notion of invisibility we can take the Heideggerian (1977) distinction between the "hammer" and "hammering". When a person is using a "hammer" (noun) while "hammering" (verb) nails into a plank to build a fence – they are neither, thinking of the hammer, nor necessarily of "hammering". The hammer only becomes the object of attention when it is *not* working or you hit your thumb. An effective, *satisfying* hammer, is one that gets the job done while never making its presence felt.

In the traditional computing era, the user whose satisfaction was of principal concern was the "End Computer User". This representative individual was seen, more or less, as a performer of tasks – consumer of content – receiver of experiences. By implication, distinctions are made then between user, provider, content and system. The more pervasive-invisible-embedded the technology becomes, the less meaningful (possible) these distinctions.

Situational, Self-Selecting User Groups (Target Populations)

Content providers need to define target markets in order to design and target content offerings. However, we argue that if providers rely on traditional grouping approaches they will miss their mark in the ubiquitous computing era. Traditional demographics (such as age, gender, education, disposition towards technology) do not capture the commonalities that exist between members of groups which form in the ubiquitous computing era. In this era user groups are ***self-selecting***. These groups form fleetingly, based upon ***situational*** conditions, and then they transform or dissipate as the conditions change. In this era the grouping of users (content creators, providers and consumers) resembles weather patterns – very transient and dynamic. A suitable graphic representation of the nature of groups in this context would look more like a live meteorological weather radar chart, rather than the static, hierarchical organizational charts, flow-diagrams and demographic models traditionally used to describe user groups and their relationships (to the content, system, and each other). The relationships between users, content and technologies on this platform are dictated by ***situational factors*** (e.g. location, time, and context). Hence, location, time, context and predicament (e.g. late for work, lost in the car, bored on the train, etc) describe the commonalities that exist between members of these groups.

However, the traditional user satisfaction construct uses ***organizational structure*** to define groups. In every study above, the user is seen to be a member of a group. In these studies we see users clustered together according to their role in an organization, which is based on the way they use the system. The user satisfaction test is given to random sample of members within these groups and then generalizations are formed that extend to encompass the group as a whole. This is how the user satisfaction construct imposes organizational structures upon groups and characteristics of satisfaction. The concern we have with this approach in the ubiquitous computing era is that it denies the essential self-selecting nature of groups on the platform. In this context, random sampling of users in order to form generalizations is highly problematic since the constituents within these self-selecting groups may have very little in common – other than their location, time, context, predicament and that they place value on the content offering at the moment of use. And once this moment has passed, that particular group may never form again. Consider the following example.

Example: User Relationships and Quality of Life Value Perceptions in the Ubiquitous Computing Era

In February 2009 severe bushfires raged across the southern states of Australia. 173 people perished. Extreme bushfire-weather conditions persisted for several weeks. During this period the State Police Force (Victoria Police) used SMS text messages to warn millions of Victorians of extreme fire danger. The alert message described high winds and fire risk in particular areas, and advised recipients to listen to local radio for emergency updates.

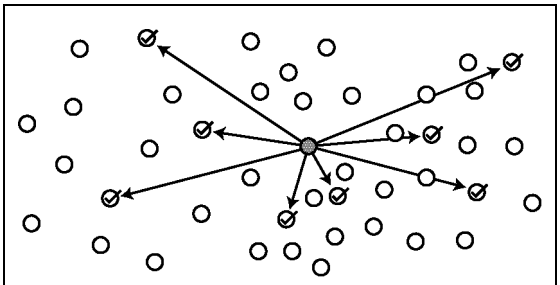

Figure 1. Model of User Relationships in the Ubiquitous Computing Era

In this case, the Victoria Police used the ubiquitous computing platform as content *creator* (the message), *provider* (sending the message) and *consumer* (of telephone numbers, networks). They occupied each role – or rather performed each function – ***simultaneously***. As such, their relationship to other users on the ubiquitous computing platform was ***multifarious-equivalent*** rather than hierarchical-organizational (see Figure 1).

In this case, every Victorian with a mobile phone received the alert message. This message was sent by Victoria Police (shown above as a grey circle) in a broad, scatter-gun approach, because it was not possible to know who might need the information. Some people who received this message found it valuable (shown above as circles with ticks). Others did not (shown as empty circles). We believe that if we were to interview a random sample of the people who placed a positive value upon the message, we would find that demographic factors (age, gender, income) were not as important as situational factors (proximity to fire) and quality of life factors (sense of danger and urgency) to describe what these people had in common.

Thus, we argue that the reasons why people found the message valuable (satisfying), were highly-specific, relating to their individual circumstances, predicaments and quality of life (such as exposure to danger of self, loved ones or property, mobility).

How then can the traditional user satisfaction construct (which relies upon the testing of random samples of members of homogeneous groups, and then the forming of generalizations which can be extended to encompass the broader group as a whole) be used to determine prospective target markets, in the ubiquitous computing environment where: (a) user groups are in a constant state of flux, (b) the members of user groups seem to have mainly situational and quality of life factors in common?

In the ubiquitous computing era, we believe that user satisfaction and wide acceptance and rapid diffusion of content will be enhanced by searching for, and understanding the inherent similarities between groups of users based upon common experiences, predicaments and perceptions of value, rather than traditional demographics. We offer the following view of participation and evaluation as a richer way to conceptualize user satisfaction in the ubiquitous computing era.

Towards Effective Evaluation of Ubiquitous Content

Let us start with an empty platform. This platform is conceptual rather than physical or technological. It is not a thing that is produced by technology, but represents how we *use* ubiquitous technology. — **Effective evaluation of ubiquitous content ... will recognize the ubiquitous computing *platform.***

In the most basic sense, people use ubiquitous computing to create and exchange content. By content, we mean information, meanings, experiences, opportunities and technologies. Thus, the ubiquitous-computing platform is nothing more than a place

where users meet to *create* and *exchange* content. — **Effective evaluation of ubiquitous content ... will recognize the ubiquitous-computing *creation-exchange* platform.**

We argue that ubiquitous technology users continuously seek to optimize each moment of their waking hours by utilizing the devices which they tend to carry with them most of the time. In this sense, the computer is acting as "an invisible servant", so imbedded-fitting-natural, that people use it without even thinking about it. In these renderings of the use of the technology we begin to glimpse the complex-whole-of-the-way-we-use-ubiquitous-technology. We perceive the "lived-body" unity of cognition and action described by Introna and Whittaker (2002).

> We do not sometimes *think* and sometimes not – we *are* thinking and nothing besides. When we say "we *are* thinking" (i.e. never separate from it), we are saying that thinking is an ongoing (without a specific start and a specific end) embodied (something we do) and situated (already in the flow of everyday life) *concern* we have with the world – we are never *not* concerned with world. This concern is both embodied and situated. We will refer to this already concerned, situated, always thinking body as the *lived-body*. (Introna and Whittaker, 2002, p.161)

People use their ubiquitous technology devices as if invisible extensions of their thoughts and bodies. The *lived-body* is thus extended into the ubiquitous-computing environment, where we are able to engage in *multifarious* relationships, sometimes *simultaneously*. **— Effective evaluation of ubiquitous content ... will recognize the *multifarious-simultaneous* nature of the ubiquitous-computing creation-exchange platform.**

At this point then, we are saying that in the ubiquitous computing era the platform is the system, and the system is nothing more than a platform where users meet to create and exchange content. If the system is *nothing more* than a conceptual platform where users meet to create and exchange content, then the technology (distinct from the conceptual platform) must be brought to, or created there by the users. In this sense, technology providers are among the users of the system and the *technology is part of the content*. **— Effective evaluation of *ubiquitous* content ... will recognize the multifarious-simultaneous nature of the ubiquitous-computing creation-exchange platform.**

The traditional user satisfaction construct is grounded in organizational structures (user roles, system characteristics, performance and success impacts). In the ubiquitous computing era, users are ubiquitous (ever-present, waiting to participate) and user groups are self-selecting. Groups form fleetingly, based upon situational conditions, and then they transform or dissipate as the conditions change. The relationships between users, content and technologies are dictated by *situational* factors (location, time, context, history-of-use). **— Effective evaluation of ubiquitous content ... will recognize the multifarious-simultaneous, *situational* nature of the ubiquitous-computing creation-exchange platform.**

According to the traditional user satisfaction construct the value of the information system is measured by (and therefore equivalent to) the level of satisfaction experienced by the user. Hence, an information system may not be considered as successful until it is valued (found satisfying) by its users. Here we see a separation between "the system" and "its users", and a lag-in-time between usage and evaluation. In the ubiquitous computing era, since users are ubiquitous (ever-present, waiting to participate) and capable of forming multifarious-simultaneous relationships (functions) they are *part* of the system. Value is placed upon the content at the moment of exchange. The evaluation therefore occurs at the moment of exchange. This evaluation encompasses the entire pervasive-invisible-embedded ubiquitous computing experience, inseparable from the objects and activities of our daily, involved lives. **— Effective evaluation of ubiquitous content ... will recognize the multifarious-simultaneous, situational nature of *participation* on the ubiquitous-computing creation-exchange platform.**

Again, according to the traditional user satisfaction construct, users are assumed to derive satisfaction from the system and that measuring levels of satisfaction is a cost-effective, convenient and reliable way to evaluate (and consequently ensure) system success. In the ubiquitous computing era users convey their satisfaction of "the system" at the moment of exchange. If an exchange does not occur, then a user was not satisfied. There are, however, many users of the system and they are ubiquitous (ever-present, waiting to participate). By this we mean that anyone who is on the platform is able to engage in multifarious relationships, so everyone is a prospective creator, consumer and provider of ubiquitous content – simultaneously. **— Effective evaluation of ubiquitous content ... will recognize the multifarious-simultaneous, situational nature of participation on the ubiquitous-computing *instantaneous*-creation-exchange platform.**

And so, on the ubiquitous-computing instantaneous-creation-exchange platform we are all prospective creators, consumers and providers of ubiquitous content. When we participate as content providers then, we may increase the effectiveness of our contributions by recognizing the multifarious-simultaneous, situational nature of ***participation***. We may enhance the success of our content offerings (increase the likelihood of wide acceptance and rapid diffusion) if we search for the inherent similarities between groups of users based upon their common experiences, predicaments and perceptions of value.

Our Research Approach

According to the above conceptualization of user satisfaction, a number of fundamental differences exist between the traditional and ubiquitous environments (see summary in Table 2 following).

Table 2: Differences in the Key Characteristics of User Satisfaction Between the Traditional and Ubiquitous Environments

Key Characteristic	Traditional Environment	Ubiquitous Environment
User expectations, entering the environment	Service provision	Instantaneous quality of life optimization
User content requirements	Related to specific defined utilitarian, hedonic or social function	Related to situation (location, time, history of use, predicament)
User context	Single, defined (utilitarian, hedonic or social) context	Continual context-switching and conflation between the utilitarian, hedonic, social contexts
User value perceptions	Utility oriented	Quality of life oriented
Common user group characteristics (stable)	Demographic profiles based upon disposition towards technology (age, gender, early adopter, laggard, etc.)	Demographic profiles based upon quality of life expectations (life stage, mobility, health, income, background, etc.)
Common user group characteristics (dynamic)	Determined by user role within the system	Determined by user circumstances and predicaments – which are constantly changing (often as a result of the usage of the ubiquitous content and technology)
Critical content characteristics	Accuracy, format, timeliness, ease-of-use	Accuracy, format, timeliness, ease-of-use, malleable (within tolerance levels) -- all ***tailored*** to situation
Content provider role	Local, involved, controller	Remote, engaged, participant
Provider-user relationship	Ongoing, hierarchical, organizational	Fleeting, equivalent, multifarious

User satisfaction in the ubiquitous computing era will depend upon situational conditions. We therefore see the aspects of context, time, location, history-of-use and predicament as important determinants of user satisfaction and intend to draw on the notions of indexicality, usability and accessibility defined in the work of Kjeldskov, Paay and Stage, to articulate these dimensions of ubiquitous content (Kjeldskov 2002; Kjeldskov and Paay 2005; Kjeldskov and Stage 2004; Paay and Kjeldskov 2004).

We argue that ubiquitous technology users continuously seek to optimize each moment of their waking hours by utilizing the devices which they carry with them most of the time. We intend to draw on established frameworks such as those of Allardt (1993) and Kim and Han (2009) which set out key dimensions of an individual's overall quality of life (having, loving, being) and perceptions of value (utilitarian, hedonic and social values) as they relate to the ubiquitous computing experience. We envision that we could put forth a series of demographic profiles based upon these dimensions to further assist providers to tailor and target their content offerings to groups of users.

The choice to use the technology and to access ubiquitous content appears to be based on such things as availability, urgency, convenience, cost, and other personal (highly specific) and sometimes irrational factors. Furthermore, it would also seem that the more unpleasant, unhealthy, or embarrassing the situation people find themselves in, the greater the urge to use available resources (such as ubiquitous technology and content) to restore quality of life. We intend to explore this notion of ***predicament*** to define the commonalities that exist between members of groups on the ubiquitous computing platform.

We intend to adopt a case study research approach to explore content development processes within provider organizations in order to build a theoretical framework which takes into account the situational and quality of life dimensions of user satisfaction of ubiquitous content and extends the notion to encompass a richer, more holistic understanding of the relationships between user-provider-content-technology in this dynamic environment.

Conclusion

In this research-in-progress paper we describe the instantaneous nature of participation and evaluation on the ubiquitous computing platform, stressing the limitations of the traditional user satisfaction construct as a measure and determinant of information system success.

In our future research we plan to investigate the situational and quality of life factors inherent in the tailoring of content and grouping of users on the ubiquitous computing platform. We propose to do this via case studies with representative provider organizations in the public and private sectors.

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